What is the relationship between alcohol intake and bone health?

Conclusion

Moderate evidence suggests a J-shaped association between alcohol consumption and incidence of hip fracture; there was a suggestion that heavy or binge drinking was detrimental to bone health.

Grade: Moderate

Overall strength of the available supporting evidence: Strong; Moderate; Limited; Expert Opinion Only; Grade not assignable For additional information regarding how to interpret grades, click here.

Evidence Summary Paragraph

Berg et al, 2008 (positive quality) performed a systematic review and meta-analysis involving 33 studies that examined the association between ethanol intake and hip fracture and bone density using a quantitative method and examined qualitatively the association between ethanol consumption and non-hip fracture, bone density loss over time, bone response to estrogen replacement and bone remodeling. MEDLINE, Current Contents, PsychINFO and Cochrane Libraries were searched for studies published before May 14, 2007. Quality of each study was assessed using the internal validity criteria of the US Preventive Services Task Force. Studies were included if they used experimental,cohort or case-control designs; included adults both exposed and not exposed to alcohol; and reported on at least one outcome. Studies were excluded if alcohol consumption and bone density were measured once at the same point in time, and if they were rated as being "poor" quality. Most studies were conducted in white, European or American adults. The results were commonly adjusted for age, body mass index and smoking, but few studies adjusted for dietary calcium, physical activity or estrogen exposure. Meta-analysis involving thirteen studies (eight prospective cohorts and five case-control) with a fair quality rating involving men and women over 20 years of age revealed a J-shaped relationship between alcohol consumption and hip fracture. Compared with abstainers, a lower risk of hip fracture was found among persons consuming up to 0.5 drinks per day (RR=0.84 [95% CI, 0.70-1.01]) and persons consuming from more than 0.5-1.0 drinks per day (RR=0.80 [95% CI, 0.71-0.91]). Those consuming from more than one to two drinks per day did not differ from abstainers (RR=0.91 [95% CI, 0.76-1.09]) and persons consuming more than two drinks per day had a higher risk (RR=1.39, [95%CI 1.08-1.79]). Four cohort studies rated fair quality, involving men and women over 50 years of age followed for 12 to 20 years evaluated the association between alcohol intake and femoral neck bone mineral density. A linear relationship existed between femoral neck bone density and alcohol consumption. Each drink per day was associated with an increase in femoral bone neck density of 0.045g per cm^2 (95% CI, 0.008-0.082g per cm^2, P=0.01). A significant linear relationship was also found at the vertebral spine. Berg indicated that since studies often combined moderate and heavier drinkers in a single category; they could not assess relative associations between alcohol consumption and bone density in moderate compared with heavy drinkers. Even though there is a positive effect of alcohol consumption on hip fracture and bone density, the exact range of beneficial alcohol consumption cannot be determined.

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Author, Year, Study Design, Class, Rating	Population/Subjects	Significant Outcomes
Berg et al 2008 Study Design: Cohort Study Class: B Rating:	33 studies (experimental, cohort or case-control designs) among white, European or American adults published before 5/14/07. Studies examined: Quantitatively, the association between ethanol intake and hip fracture and bone density. Qualitatively, the association between ethanol consumption and non-hip fracture, bone density loss over time, bone response to estrogen replacement and bone remodeling.	Meta-analysis involving 13 studies (eight prospective cohorts and five case-control) with a fair quality rating involving men and women >20 years of age showed a J-shaped relationship between alcohol consumption and hip fracture. Compared with abstainers, a ↓ risk of hip fracture was found among persons consuming up to 0.5 drinks per day (RR=0.84 [95% CI, 0.70-1.01]) and persons consuming from >0.5-1.0 drinks per day (RR=0.80 [95% CI, 0.71-0.91]). Those consuming >one to two drinks per day did not differ from abstainers (RR=0.91 [95% CI, 0.76-1.09]) and persons consuming >two drinks per day had a ↑ risk (RR=1.39, [95%CI 1.08-1.79]). Four cohort studies rated fair quality, involving men and women >50 years of age followed for 12 to 20 years, found a linear relationship between femoral neck bone density and alcohol consumption.

Research Design and Implementation Rating Summary
For a summary of the Research Design and Implementation Rating results, click here.

Worksheets

Berg C, Lappas G, Wolk A, Strandhagen E, Torén K, Rosengren A, Thelle D, Lissner L. Eating patterns and portion size associated with obesity in a Swedish population. *Appetite*. 2009 Feb;52(1):21-6.